DIAGNOSTIC PUNCTURE IN TUBERCULOUS ABSCESSES.

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The profession has become familar with puncture of the peritoneal, pleural, and pericardial cavities, with lumbar puncture, exploratory aspiration of the liver, of certain cysts and collections of localized pus, but puncture of tuberculous abscess for diagnostic verification as a routine procedure has been neglected.

From the earliest periods of medical knowledge down to the present time physicians have hesitated to evacuate cold abscesses—so-called—because of doubt as to the character of their contents. The too frequent production of mixed infection meant prolonged sepsis with all its serious complications and frequent death. If by diagnostic puncture one can ascertain to a certainty the bacteriological composition of the contents, the necessity for incision and drainage or the opposite can be definitely determined. The following paper is founded upon a personal experience which has proved the great value of diagnostic puncture in this class of cases.

The diagnostic puncture should be made with an exploring syringe veterinary syringe, or lumbar puncture syringe, or with an ordinary hypodermic syringe, since the object is not to withdraw a large quantity of fluid for therapeutic purposes, but only sufficient for laboratory examinations. The puncture should be performed under the most strict antiseptic precautions, both in regard to the preparation of the part to be punctured and the instrument employed and the hands of the surgeon. The part must be thoroughly scrubbed with green soap and sterile water, with bichloride solution, with alcohol, and finally with ether or turpentine. The hands of the surgeon should be thoroughly scrubbed with green soap and sterile water and soaked in alcohol and a bichloride solution. The syringe and needles should be thoroughly boiled for twenty minutes and kept in alcohol until used. The syringe which I use is the small glass one made for hypodermic purposes. The puncture should not be made in the most prominent or thinnest part of the collection, but through sound skin, care being taken to avoid large veins and important structures.

The pain caused by the puncture may be diminished by local anesthesia with ethyl chloride, cocaine being seldom necessary and ice and salt not being sterile. A portion of the fluid withdrawn in the syringe should be placed in a sterile test-tube prepared for the purpose of the subsequent laboratory examinations, and the remaining should be dropped upon one or more prepared slides for immediate clinical microscopic examinations. The puncture should be sealed with sterile cotton or gauze and collodion. If the fluid cannot be withdrawn through so fine a needle, the larger exploring syringe or the Potain or other vacuum aspirator should be employed.

The exploratory puncture for diagnostic purposes should be made several days before any contemplated operation in order to use the laboratory findings in the surgical treatment of the abscess or of the primary pathological lesion. In slowly forming exudates of questionable character advantage may be taken of this delay to determine by inoculation their exact pathological character.

EXAMINATION OF THE FLUID. More important than the determination of the physical character of the fluid, the color, coagulability, odor, and transparency, is the information obtained by the microscopic examination and the culture findings. The examination should also include the cell counting, of the same character as the cytodiagnosis employed in pleural effusion. If there is a marked increase in the lymphocytes, over 50 per cent. of this should be in favor of tuberculosis, since the predominance of polymorphonuclear cells would indicate a non-tuberculous origin.

If the fluid withdrawn is sanguinolent, a careful comparison with the blood of the individual, taken at the same time will be of great value, as shown in Case II.

The presence or absence of bacteria in large quantities, such as tubercle bacilli, staphylococci, streptococci, and actinomycosis can readily be determined by this most simple microscopic examination, but the advantages of waiting for the laboratory reports are the more accurate conclusions which may be deducted by taking into consideration the physical characteristics together with the microscopic and culture findings.

If the smear slides are not satisfactory, and the culture findings are negative for tuberculosis, inoculation of guinea-pigs should be made in suitable cases. In all doubtful cases this has invariably been the my practice. These reports are, however, received so late that they are confirmatory rather than of any practical value in operative treatment.

The examination of fluid taken from 25 operative cases several days before operation by myself, all of which were diseases of the joints and some of which required excisions of the major joints, 3 being excision of the hip joints, showed 6 to contain tubercle bacilli, 6 to contain pyogenic organisms, and 12 were sterile. Among the organisms found were streptococci, staphylococci, Bacillus pyocyaneus, and pneumococci. Of the sterile abscesses, inoculation into guinea-pigs showed that 2 were negative and 1 positive for tuberculosis.

The examination of the fluid is not only valuable in determining the character of the disease, but is also important in deciding what operative measures shall be adopted. The treatment of the abscesses themselves will vary according to the findings, and in the cases described by me in a previous paper,[1] three different groups were made according as the aspirated fluid was sterile or contained tubercle, or had mixed infection. The examination of the fluid enables the operator to decide whether an operation is immediately required, as well as the character of the operation demanded.

The following cases illustrate the value of diagnostic puncture in tuberculous abscesses:

CASE I.—R. F., a white boy, aged four years, came under my care November 26, 1906, having suffered from left knee-joint disease since June, 1905. The family history was negative, except that one paternal aunt died of hip tuberculosis. The joints presented the characteristic symptoms of tuberculous disease, being enlarged, pale, with prominent veins, the knee fixed at an angle of 15 degrees. Upon the anterior aspect of the thigh, about 6 inches above the patella, was a large abscess. The *x*-ray examination of the knee-joint showed partial destruction of the epiphysis of the femur, with thickened synovial membrane and no fluid within the joint; the diagnostic puncture showed the fluid to be sterile, and inoculation of guinea-pigs with this fluid was negative for tuberculosis.

The abscess was incised, thoroughly curetted, and closed without drainage, a firm compress was applied, and the limb was fixed in a plaster-of-Paris cast. Recovery was prompt and permanent, and there has been no return of the disease. Without diagnostic puncture the patient would have had his abscess incised and curetted and had drainage inserted for many days, with possible infection of the part.

CASE II.—J. O., aged eight years, was admitted to the Polyclinic Hospital, April 19, 1906. His parents were living and there was no tuberculous history in the family. The child had had the usual exanthemas of youth, and when five years of age he injured his right hip by falling while roller skating. After a month's treatment at home he was admitted to the hospital under my care, for flexion of the hip-joint. This was overcome and the adhesions broken up by manipulation and tenotomy of the right sartorius at its origin. In August, 1906, he received another injury by a kick on the hip, which renewed the inflammation in the hip-joint. Upon his admission in November there was some induration and swelling of the hip-joint, with enlarged inguinal glands; there was some limitation of motion, and he walked with a limp. The *x*-ray examination at this time showed changes in the cartilage of the head of the femur; his physical examination was otherwise negative. His pain increased and became excruciating, notwithstanding the use of a Buck's extension and a lateral weight applied to the upper part of the femur. On December 13, under ether narcosis, I aspirated the hip-joint and removed two drains of bloody fluid, which contained bone marrow, and which showed a rupture of the abscess from the medullary structure into the cavity of the joint.

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[1] Amer. Jour. Orthop. Surg., 1907.

The report of the laboratory findings of this diagnostic puncture by Dr. John M. Swan, of the Polyclinic Hospital, is of great value, and compared with the examination of his blood taken at the same time verified the opinion that the fluid had ruptured from the bone into the joint cavity at this time. These examinations are given side by side for comparison. The bacteriological examination of the fluid was negative for tuberculosis. The diagnostic puncture entirely relieved the pain, and he subsequently made a satisfactory recovery under mechanical treatment.

Blood Count, December 17, 1906.
Differential count:

	Per cent.
Polymorph. nucleated	52.0
Lymphocytes	18.0
Transitional	17.4
Eosinophiles	9.8
Basophiles	1.2
Myelocytes	1.6
	100.0

Specimen of fluid aspirated gave the following; about pure blood with large white cells:
Differential count:

	Per cent.
Polymorph. nucleated	36.4
Lymphocytes	32.0
Transitional	7.2
Eosinophiles	3.4
Basophiles	0.4
Myelocytes	18.6
Eosinophiles and Myelocytes	2.0
	100.0

Without the information obtained by diagnostic puncture this patient would possibly have been subjected to incision or excision of the hip-joint with prolonged drainage and the possibility of mixed infection.

Case III.—W. G., male, aged sixteen years, came under my care January 20, 1907, suffering from tuberculosis of the left knee-joint. Five years before he had been operated on for congenital double dislocation of the hips; the left one was perfectly reduced and the other one partially reduced, the tuberculous knee for which he presented himself being in the perfectly reduced side. The examination of the diagnostic fluid showed the presence of a few streptococci and a large number of staphylococci. The joint was opened by incision through the skin on the inner side, and the division of the synovial sac by the Paquelin cautery and counter-incision in the same manner on the outer side, with thorough irrigation with a 5 per cent. of formalin solution and drainage. He made a prompt recovery. The diagnostic puncture here enabled me to drain thoroughly and promptly the knee-joint.